

Attachment 2

Corrective Action Plan

Accomplishments and Implementation Schedule

Recommendation	Detail	Risk To Operations	Risk Ranking	Captured in Current Task	Corrective Actions Completed and Schedule to Complete
<p><u>Plant Performance Targets should be clearly defined.</u></p> <p>(Action – Define performance targets)</p>	<p>Targets for operations staff in terms of production, quality, safety and other regulatory requirements are not clearly defined. We recommend this so that staff can compare performance against targets.</p>	<p>If no measurement against targets, plant may operate poorly with no driver to address.</p>	5/10	Operational Performance Monitoring	2 – 3 months
<p><u>Operating Performance is not sufficiently analyzed and trended.</u></p>	<p>There is a vast amount of information recorded on the HMI/SCADA and operating log sheets, however it is not presented or reviewed adequately to gauge plant performance. We recommend that trending of important parameters be set up and regularly reviewed to measure performance against overall plant and process unit specific targets. This is important for water quality targets and internal process performance targets.</p>	<p>Plant and process issues not identified in timely fashion. Risk to water quality and plant equipment.</p>	7/10	Operational Performance Monitoring	<p>6 – 9 months</p> <ul style="list-style-type: none"> ✓ Model has been created and installed. Staff training will begin next week.
<p><u>Water Quality Management and Monitoring has shown great improvement.</u></p>	<p>This area in particular is advancing well, with robust procedures and a sampling plan being developed. We recommend using this work as a basis for a comprehensive water quality management plan for the facility (which could be incorporated into a revised OMMP).</p>	<p>Water quality and regulatory risks.</p>	9/10	SOP Development	<p>7 – 9 months</p> <ul style="list-style-type: none"> ✓ Sampling Plan submitted to Department of Drinking Water (DDW), formerly known as California Department of Public Health. Staff is current working with DDW to review each Plan section and revise as needed. ✓ Additionally, staff has implemented an improved sampling management system with clear chain of custody procedures.

Recommendation	Detail	Risk To Operations	Risk Ranking	Captured in Current Task	Corrective Actions Completed and Schedule to Complete
<u>The Reverse Osmosis (RO) system is not analyzed correctly.</u>	The RO system performance data is not normalized, and consequently performance has not been reviewed adequately, leading to substantial worsening of condition.	Risk to membranes, equipment and water quality.	7/10	Operational Performance Monitoring	3 – 4months
<u>The RO system membranes (first stage in particular) are in very poor condition, leading to increased salinity in the treated water.</u>	These membranes are leaking salt an order of magnitude above what is anticipated for membranes in this operation. The overall cause for poor condition must be investigated and resolved, followed by the installation of new membranes.	Risk to water quality	9/10	Ongoing support.	Replacement scheduled to occur during plant rehab project. ✓ Autopsies on 4 current membranes have been completed. Results will be used to improve process control and new membrane specifications.
<u>The RO Unit is not operating correctly, and requires a concentrate valve to be replaced as a matter of urgency.</u> (Valve specified to allow alternative supply)	This is critical for controlling RO recovery, which is itself critical for successful unit operation.	Risk to equipment, water quality.	9/10	RO Unit Operation Options and Concentrate Minimization Strategy	Complete. ✓ The valve has been replaced and is currently in operation.
<u>A concentrate reduction strategy should be considered.</u>	A review of current RO feed water chemistry, membrane selection and antiscalant to determine an optimum RO unit recovery. A higher recovery, if possible, can reduce brine production from unit and increase overall treated water yield from the plant.	Opportunity for improvement	5/10	RO Unit Operation Options and Concentrate Minimization Strategy	6 – 9 months ✓ Currently in evaluation

Recommendation	Detail	Risk To Operations	Risk Ranking	Captured in Current Task	Corrective Actions Completed and Schedule to Complete
<u>Provide options for lower RO unit throughput, based on lower well yields.</u>	This review (combined with the concentrate reduction strategy) may provide operating cost savings in terms of membrane costs, pumping energy costs and chemical dosing) as well as provide more suitable system hydraulic operating conditions.	Risk to final water quality and plant infrastructure (concrete erosion) from aggressive water.	7/10	RO Unit Operation Options and Concentrate Minimization Strategy	4 – 5 months
<u>Final Treated Water blend may be corrosive to concrete.</u>	We recommend a review of water chemistry and blending along with monitoring of water stability indices to ensure protection of plant concrete infrastructure such as cement lined pipes and the concrete clear well.	Risk to final water quality and plant infrastructure (concrete corrosion) from aggressive water	7/10	RO Unit Operation Options and Concentrate Minimization Strategy	6 – 9 months ✓ Laboratory analysis is currently being conducted to better characterize treatment process effectiveness.
<u>Arsenic Management Plan, a regulatory requirement outlined in the OMMP, does not appear to be followed.</u>	This is a requirement of the permit, and included in the OMMP, however does not appear to be entirely operational. We recommend this plan is checked for compliance.	Risk to water quality compliance.	9/10	SOP Development	3-6 months ✓ Staff has worked with DDW to confirm the current Arsenic management process is adequate. The plan will be revised to reflect current practices. ✓ Additionally, staff is in the process of purchasing arsenic monitoring equipment which will provide continuous and real time data.

Recommendation	Detail	Risk To Operations	Risk Ranking	Captured in Current Task	Corrective Actions Completed and Schedule to Complete
<p><u>The Operations Maintenance and Monitoring Manual (OMMP) is not known to operators and is not in use. We recommend creating a revised, updated OMMP.</u></p>	<p>This is a major risk of non-compliance to the plant operating permit and in itself may constitute a non-compliance. We recommend as a matter of urgency that the city confirm with the State Regional Water Quality Control Board (formerly CDPH) if the version found during our visit is the current lodged with the regulator. Further, we recommend that this form the basis of a thorough revision to include important shortcomings as well as updates to reflect existing operation.</p>	<p>Risk to water quality, plant operations and permit compliance.</p>	<p>9/10</p>	<p>SOP Development</p>	<p>9 months</p> <ul style="list-style-type: none"> ✓ All staff has been provided their own copy of the existing OMMP. They are now using this plan as reference in their daily work. ✓ DDW is currently reviewing the current plan and will provide feedback on improvements needed.
<p><u>Plant Weekly Operator Logs are Unwieldy and Unhelpful.</u></p>	<p>We have recommended a revised log sheet, as the current log contains a lot of data recorded but the key trends are not reviewed to determine plant performance or identify operational risks. It is data rich, but knowledge poor.</p>	<p>Risk to plant performance and water quality.</p>	<p>7/10</p>	<p>Operational Performance Monitoring</p>	<p>To be finalized at end of Operational Monitoring program.</p>
<p><u>A non-conformance/corrective action process is recommended.</u></p>	<p>In order to capture learnings from problems or incidents, we recommend a non-conformance and corrective action system. This will involve reporting incidents and effectively taking from lessons learned to improve operations into the future.</p>	<p>Opportunity for improvement (ongoing)</p>	<p>4/10</p>	<p>Not specifically included but can be part of SOP Development</p>	<p>6 – 9 months</p>

Recommendation	Detail	Risk To Operations	Risk Ranking	Captured in Current Task	Corrective Actions Completed and Schedule to Complete
<u>A Safety and Emergency Management Plan is recommended.</u>	We could not find a comprehensive safety plan on site covering the multiple safety issues that are encountered at an operational facility. We recommend that a plan be developed, to ensure safety hazards.	Opportunity for improvement (ongoing).	8/10	Not specifically included but can be part of SOP Development	6 – 9 months
<u>An Operator Training Program is recommended as a matter of urgency.</u>	Operators are currently not sufficiently familiar with water chemistry, RO unit operation and other plant processes. We recommend a training program be developed to encompass process, operational procedures, safety and other necessary operational elements to ensure operators are well equipped to manage the plant.	Risk to water quality and process equipment.	9/10	Operator Training	2 – 3 months ✓ Hazen and Sawyer have begun training plan development with staff.
<u>Development for Standard Operating Procedures (SOP) is recommended</u>	Leveraging from work already begun by the city, we recommend developing a number of robust operating procedures, developed with and by the operators themselves, to cover operation of all aspects of the plant. There are currently few procedures in use, and much operation is performed by memory and word of mouth.	Risk to plant, equipment and water quality.	8/10	SOP Development	9 -12 months Staff has begun drafting SOP's.

Recommendation	Detail	Risk To Operations	Risk Ranking	Captured in Current Task	Corrective Actions Completed and Schedule to Complete
<u>More use of trending from the HMI should be adopted to keep track of process and water quality performance.</u>	There is an abundance of data reported, however trends are more useful for performance analysis, diagnostics and decision making. We recommend that a set of standard trends be developed.	Opportunity for Improvement	6/10	Operational Performance Monitoring	6 – 9 months
<u>Develop a high level plant Dashboard Report, to define key performance requirements at a glance. This will be helpful to track performance against targets.</u>		Opportunity for improvement.	7/10	Operational Performance Monitoring	6 – 9 months
<u>Conduct a criticality and condition assessment to determine appropriate spares and maintenance strategy to meet a desired plant availability.</u>		Opportunity to improve maintenance costs and plant availability/reliability.	6/10	Ongoing support	9 – 12 months

Attachment 3

AMENDMENT NO. 1 TO AN AGREEMENT BETWEEN THE CITY OF
BEVERLY HILLS AND HAZEN AND SAWYER TO PROVIDE THE CITY
OF BEVERLY HILLS WITH WATER TREATMENT OPERATIONS
SYSTEMS AND PROCESSES CONSULTING SERVICES

NAME OF CONSULTANT:	HAZEN AND SAWYER
RESPONSIBLE PRINCIPAL OF CONSULTANT:	Lynn Grijalva, P.E., Vice President
CONSULTANT'S ADDRESS:	Hazen and Sawyer 1149 South Hill St., Suite 450 Los Angeles, CA 90015 Attention: Lynn Grijalva, P.E. Vice President
CITY'S ADDRESS:	City of Beverly Hills 455 N. Rexford Drive Beverly Hills, CA 90210 Attention: George Chavez, Director of Public Works Services
COMMENCEMENT DATE:	July 14, 2014
TERMINATION DATE:	February 28, 2016
CONSIDERATION:	Original Amount: Not to exceed \$41,000 Amendment No. 1: Not to exceed \$229,000 Total: Not to exceed \$270,000.00, and more particularly described in Exhibit B

AMENDMENT NO. 1 TO AN AGREEMENT BETWEEN THE CITY OF BEVERLY HILLS AND HAZEN AND SAWYER TO PROVIDE THE CITY OF BEVERLY HILLS WITH WATER TREATMENT OPERATIONS SYSTEMS AND PROCESSES CONSULTING SERVICES

This Amendment No. 1 is to that certain Agreement between the City of Beverly Hills (hereinafter called "CITY"), and Hazen and Sawyer (hereinafter called "CONSULTANT") dated July 18, 2014 and identified as Contract No. 358-14 ("Agreement").

RECITALS

A. CITY entered into a written agreement with CONSULTANT for water treatment operations and processes consulting services.

B. CITY and CONSULTANT desire to amend the Agreement to extend its term, add services and increase the compensation for such services.

NOW, THEREFORE, the parties agree as follows:

Section 1. The TERMINATION DATE shall be amended as set forth above.

Section 2. The CONSIDERATION shall be amended as set forth above.

Section 3. Exhibit A, "Scope of Work," shall be amended as attached hereto and incorporated herein.

Section 4. Exhibit B, "Schedule of Payment and Rates," shall be amended as attached hereto and incorporated herein.

Section 5. Except as specifically amended by this Amendment No. 1, the remaining provisions of the Agreement shall remain in full force and effect.

EXECUTED the ____ day of _____ 20____, at Beverly Hills, California.

CITY OF BEVERLY HILLS
A Municipal Corporation

LILI BOSSE
Mayor of the City of Beverly Hills, California

ATTEST:

BYRON POPE
City Clerk

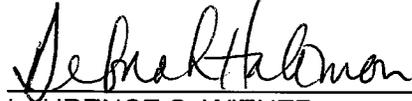
HAZEN AND SAWYER

LYNN GRIJALVA, P.E.
Vice President

WILLIAM CRAYON
Controller

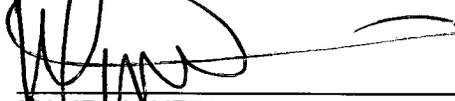
[Signatures continue]

APPROVED AS TO FORM:



LAURENCE S. WIENER
City Attorney

APPROVED AS TO CONTENT



MAHDI ALUZRI
Interim City Manager

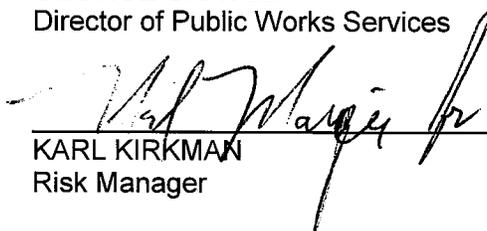

GEORGE CHAVEZ
Director of Public Works Services
KARL KIRKMAN
Risk Manager

EXHIBIT A
SCOPE OF WORK

SCOPE OF WORK AS OUTLINED IN ORIGINAL AGREEMENT:

Phase I – Baseline Review

CONSULTANT shall conduct a baseline review of operations at the CITY's water treatment facility. This review will cover existing systems and processes, risks and bottlenecks to performance, opportunities for improvement and will identify gaps that need to be addressed. This review will include:

- A review of current plant targets and performance against those targets (focusing on production, water quality, and regulatory reporting).
- A review of plant process performance.
- A review of current documented systems and processes.
- Interviews with operations staff and operations management.
- A review of communication practices and protocols.
- A review of operator knowledge/training gaps.
- Based on our initial discussions of June 25, we suggest a focus on the key elements of:

CONSULTANT shall focus on the following areas during this baseline review:

- Roles and responsibilities – mapping of roles and responsibilities of the team – and identifying any conflicts or gaps.
- Operational monitoring and reporting – review of current monitoring and reporting, both internally and particularly external reporting requirements.
- Non conformances and corrective actions – review how non-conformances are identified, reported and dealt with. A key focus will be on how to capture lessons and learn from past problems.
- Operating Interfaces – a review on communication between elements of the organization (for example treatment to distribution) and how communication operates between different shifts.
- Operating Procedures – A review on what is documented and how. Our experience has shown that operator engagement in the development of operating procedures is key to ownership of the process and empowerment in operation.

- Operator skills and training. – Understand the level of knowledge and confidence in operations staff. We can identify gaps to help develop a targeted training approach to plug the gaps and enhance operator empowerment.

The deliverable output from this phase I will be a report to operations management on all findings, including a gap analysis of needs and a recommended prioritization of actions.

During this phase, CONSULTANT will work with CITY to identify improvements to implement in Phase II. These may include the following:

- Develop/improve operational logs/monitoring reports.
- Develop a high level dashboard report
- Provide specific training to operations staff.
- Provide modifications to necessary operating procedures, or create interim draft procedures where required

Phase II – Develop Priorities and Plans

CONSULTANT shall work with CITY operations staff and management in the Department of Public Work Services to develop an action plan to address the key findings of phase I. This phase will include both working with operations management, and a workshop with various operations staff. This workshop will provide both feedback to Phase I, and work to engage the operations team as a part of the process.

The deliverable output from Phase II will be to develop an agreed prioritized action plan for development/enhancement of the operating framework, including a schedule for implementation. The key focus will be to identify the most urgent areas for improvement balanced with a set of modest early goals to help demonstrate meaningful progress and keep the process energized.

AMENDMENT 1: ADDITIONAL SCOPE OF WORK

CITY and CONSULTANT have identified the following four fixed items of high priority:

- Reverse Osmosis (“RO”) Optimization Strategy, Concentrate Minimization Strategy and Valve Specification
- Operator Process Training
- Operating Performance Monitoring Improvements
- Standard Operating Procedure (SOP) Development

CONSULTANT shall perform the following additional services:

I. RO Optimization Strategy

This task aims to provide options for improved operational efficiency for the RO unit. It focuses on a number of areas including:

- Reduced flow operations.

Lower yields from the plant supply wells have reduced the available feed water to the plant. As noted in CONSULTANT's report, dated 10/31/2014, this has impacted the water treatment plant bypass/RO permeate blending strategy which impacts water stability management due to a change from the originally intended blend strategy. RO units are essentially constant flow devices, with very little ability for turn down in flow production on a per unit basis, due to important membrane hydraulic operation considerations.

This work will involve review options for reducing flow rate through the unit on a long term basis and consider options such as isolation of pressure vessels, review of feed pump and control impacts, and RO system design selections.

- Concentrate minimization strategy.

This task will focus on optimizing the current RO unit recovery, based an assessment of feed water chemistry (and blending ranges given multiple well feeds), pH management and antiscalant selection. It was noted in CONSULTANT's report that the recovery of the RO has been reduced significantly since the original plant design (below 70% as compared with an initial value of 78%). Also included will be a review of likely concentrate flow based on CONSULTANT's assessment of a reduced RO flow rate overall (as noted above).

In addition, a high level discussion of options for further increased concentrate minimization beyond the optimum RO recovery will be provided for your consideration (such as alternative concentrate recovery strategies).

- Concentrate Valve Specification

The current concentrate valve is out of service, and there is difficulty in procuring an exact replacement. CONSULTANT will develop a design specification for a replacement RO valve and actuator to provide CITY some flexibility in procurement of a replacement valve and spares from alternative suppliers.

- Stripping Tower Operation Optimization

The current shut down and restart of the stripping towers creates operational difficulty as material that accumulates on the stripping towers during evening and weekend shut down periods sloughs into the treated water causing high turbidity peaks and aesthetic quality issues. A review of design and operation will be conducted with recommendations to minimize this impact and increase operational flexibility.

The work products of this task are a brief options report and specification for the RO concentrate valve. The estimated cost is not to exceed **\$35,000**, as more fully described in Exhibit B.

II. Operator Training

CONSULTANT shall provide operator training. Operator training is a critical part of operations success. Several training areas were identified in the baseline review as follows:

Topic Area	
Permits and Regulations	Operating Permit Environmental Permits Other regulatory requirements.
Water Quality Sampling and Testing	Types of samples Proper sampling technique Labelling requirements Chains of custody Sample locations Sample frequency Process v Regulatory Sampling and Testing Process Control Testing Procedures Instrument Use
Safety	Safety (OSHA) requirements Identify safety hazards Emergency Management Incident reporting and investigation City safety policies
Instrumentation	Read/record values from gauges and displays Understanding Units of measure Standardization/calibration/verification
Equipment and Maintenance	Identify/describe components of equipment Start/stop procedures Identify normal operation Understanding of standard operating procedures
SCADA	Navigate screens Identify/acknowledge alarms Generate/select graphs and interpret results Start/Stop a process or entire facility for planned or emergency shutdown.
Process Technology	Process and Plant Overview Chemical dosing and handling Reverse Osmosis and Pretreatment Water chemistry and impacts to process H ₂ S Stripping Air Scrubbing Final chlorination

The initial set of training modules will be on Process Technology to provide a better understanding of the treatment processes.

- Process and Plant overview
- Chemical Dosing and Handling
- Reverse osmosis and Pretreatment
- Water Chemistry and post treatment including H₂S stripping, air scrubbing and final chlorination.
- Post treatment including H₂S Stripping, Air Scrubbing and final chlorination

CONSULTANT estimates the cost of not to exceed **\$20,000** for tailoring the training sessions, and conducting four half-day sessions at CITY. The work product will be bound sets of session notes and materials for all participants.

III. Operating Performance Monitoring Improvement

One of the significant challenges in managing processes within a treatment facility is to monitor performance using the abundant data collected by Supervisory Control and Data Acquisition ("SCADA") and Human Machine Interface ("HMI") systems.

This proposed task is to improve the operational performance monitoring of the plant and distribution systems with the development of the following:

- A clear definition of performance targets. It is important to know clearly what CITY is aiming for in operations so that CITY can measure its success in getting there, and identify any barriers to achieving it. CONSULTANT proposes to work with CITY to develop a set of operational performance targets that CONSULTANT can measure and track performance against. These will be developed at the overall plant level, and also at individual process unit level.

For example, at the plant level, targets will be identified such as daily throughput, water quality, chemical consumption, energy consumption, 100% of samples taken correctly, 100% of SWRCB reports on time, 100% permit compliance. (Note that water quality targets may be in addition to permit requirements, to protect water treatment plant infrastructure or provide buffer for the permit target).

At the process level, targets will be identified to ensure the process systems are operating properly to meet overall targets or safeguard equipment. For example, performance targets for RO permeate quality, stripping tower treated water quality.

- Development of dashboard reports. Dashboard reports are useful to provide a quick overview of plant or system performance. They are usually a set of simple graphs, dials or red/yellow/green shaded squares that provide a quick review of performance against high level targets. These are extremely valuable both for management review, but also in communication to the team on overall performance.

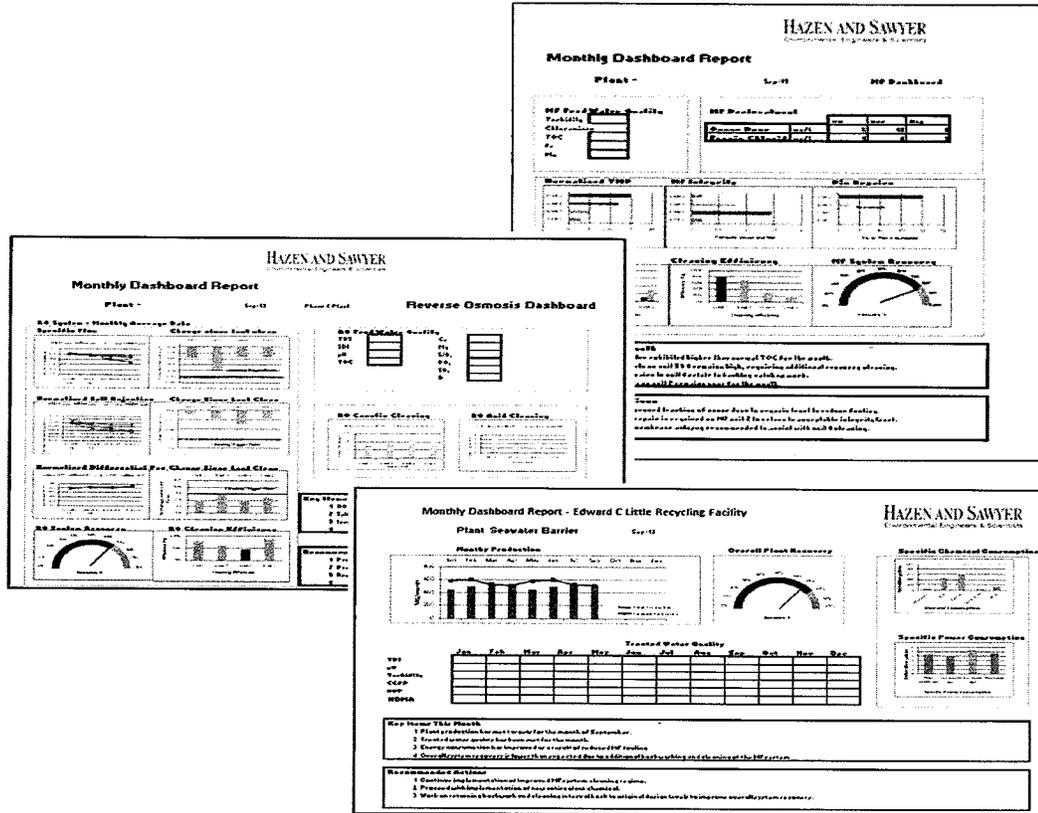


Figure 1 - Example dashboard reports

- Review and improvement of SCADA/HMI trending. The HMI already has a number of valuable trends that are useful, however it is capable of much more. CONSULTANT will work closely with the SCADA engineer to help develop a more detailed set of standard trends, with the understanding of what the current system is capable of. This will cover key process operation and performance parameters.
- Reverse Osmosis System Normalization. Normalization of reverse osmosis data is very important to ensure that the performance of the membranes can be accurately reviewed. Normalization software has been provided for the site, CONSULTANT will help populate this software, and begin important normalization trends for the RO system. As a further improvement, CONSULTANT will work to provide an automatic download of data from the SCADA/HMI system direct to a normalization tool to enable easier review of data by CITY operations staff.
- Review and establishment of preferred operator log sheets. This item is a follow up to work conducted in the baseline review. This will be a final review of the improvements made to standard trends further developed on the HMI.

To develop the best outcome for CITY, CONSULTANT will engage closely with CITY staff, and collaboratively develop operations monitoring material. Additionally it will be necessary to coordinate and work with CITY's preferred SCADA/HMI engineer (for which we have not included costs). CONSULTANT recommends a monthly review of progress, at which CITY and

CONSULTANT will make continuous improvements and assess if additional effort may be required from either CONSULTANT or CITY. The schedule can be developed to work in alignment with water treatment plant upgrade, with early development of those items not affected by the water treatment upgrade. CONSULTANT's estimate assumes approximately one day per week over a nine month period, which will be dependent on plant upgrade progress.

The work products of this task will be:

- Monitoring Improvement Progress List to be updated monthly for a nine month period
- Performance Targets
- Dashboard Reports
- HMI/SCADA Trending Tools
- RO Normalization Tools
- Revised Operator Log Sheets

The estimated cost for this task is not to exceed **\$51,000**, as more particularly described in Exhibit B.

IV. SOP Development

It is recommended that key standard operating procedures ("SOPs") be developed to supplement SOPs already identified by CITY, and to include additional SOPs as identified as a result of the upgrade works planning.

In this proposed scope CONSULTANT has separated the development of SOPs as a separate scope item to CONSULTANT's recommended Operations and Maintenance Management Plan ("OMMP") development. The OMMP development, rather, is listed as an ongoing support item. It is nonetheless important to optimize the effort involved, that the OMMP and SOPs are both updated in conjunction with the planned plant modifications that will be taking place this year. It is recommended that the work on updating of the standard operating procedures begins soon, and work in conjunction with these changes as they take place. This will ensure that SOPs are up to date with the system upgrade.

The recommended scope and approach for this task are as follows:

- **Water quality monitoring and reporting plan update**

As acknowledged in CONSULTANT's baseline report, the Water Quality Sampling Plan has taken great strides in capturing requirements for water quality monitoring at the plant. This task will include adding water quality regulatory requirements, process water quality monitoring, instrument calibration and verification to develop a comprehensive water quality management plan. This plan may or may not be later included in the OMMP.

- **Develop schedule for SOP development.**

This task will include developing an agreed schedule of SOPs for the plant with a

schedule for completion of each SOP. As for the OMMP, for each SOP, a nominated CONSULTANT staff member along with a CITY staff member will be identified to support each area, along with a targeted completion date. As for the OMMP, CONSULTANT will work to prioritize based on the schedule of the water treatment plant upgrade.

- **Develop SOPs**

This task will include development of SOPs in conjunction with CITY staff. Monthly status review will be included for this task as progress will rely on CITY staff availability and upgrade progress.

The work products of this task are:

- Water Quality Monitoring and Reporting Plan Update – draft and final
- Standard Operating Procedures – draft and final for each individual SOP

These products will be submitted in electronic versions as pdf for formal record and in editable form for flexible updates in the future. The estimated cost for this task is not to exceed **\$63,000**, as detailed in Exhibit B.

V. Ongoing Support – Monthly Not-To-Exceed Rate

A number of the recommendations that have been made for operational improvement will take time, and be reliant on timing and availability of CITY staff and other contractors. Importantly, many of the improvement steps that have been recommended must be scheduled such that they co-ordinate well with the water treatment plant upgrade, to ensure there is no unnecessary re-work.

It is important that the OMMP is completed to reflect equipment and operations following the water treatment plant and equipment upgrade.

By working to a monthly not-to-exceed rate, it is possible to address the requirements of the CITY in a timely manner, with flexibility to adjust to the requirements of the upgrade works and other CITY staffing demands. It will also be possible to tailor the development of operational systems to fit with this schedule, to take advantage of the time available during the upgrade.

For the ongoing support, CONSULTANT shall propose to include the OMMP update as an ongoing support item.

The ongoing support shall include additional scope items to support the CITY during the upgrade phase which shall include:

- CITY representation/technical support for the upgrade works currently underway by GHD.
- Conduct and attend an Optimization Prioritization Meeting (estimated to be 3 days) to work through the proposed upgrade schedule, set priorities for the City and align schedules for operational components (OMMP, SOPs, monitoring).

- Determine plant availability based on current configuration and determine process/equipment bottlenecks.
- Assist with the development of additional training for CITY, for non-process items (as noted above).

A. Update Operations Maintenance and Monitoring Plan (OMMP)

The OMMP is a critically important document for operations, and should contain the key documented elements to operate the plant safely and reliably to meet production, water quality and other regulatory targets. The OMMP is an explicit requirement of the water treatment plant permit, and it must be kept current as a compliance requirement.

The current OMMP appears to not be up to date and incomplete in some sections. It is recommended that the OMMP undergo a thorough overhaul and update to bring it into line with current operation and regulatory requirements.

In performing this scope of work, it is important to strike a balance providing a sufficient level of detail to inform operations and satisfy regulatory requirements, while at the same time providing sufficient flexibility for operations to ensure that any minor alterations to operating instructions or processes may be implemented without wholesale changes required. For example, some standard operating procedures, sampling planning documents and other items may be referenced by the OMMP, but not specifically included within it.

Recognizing that the plant will undergo refurbishments in the coming months, it is recommended that a schedule of OMMP update be developed to best match with the upgrade schedule and incorporate plant and operational changes. This item is now separate from SOP development, however both tasks should be coordinated for best efficiency.

The recommended scope and approach for this task are as follows:

- **Content and Schedule Planning for OMMP Update**

This will be in the form of a workshop with key operations staff, to agree on OMMP table of contents, sections for updated and a schedule for updating those sections based on the plant upgrade schedule. For each chapter, select CONSULTANT staff along with CITY staff will be identified to support each area, along with a targeted completion date.

- **OMMP Update**

This task will include the updating of the OMMP, as discussed in the above schedule plan. It will include support from CONSULTANT in conjunction with nominated plant staffing. Regular status review will be included for this task as progress will rely on CITY staff availability and upgrade progress.

The work product for this task is:

- OMMP Update, individual draft sections, complete draft and final

B. Client Representation/Technical Support for the Upgrade Works Currently Underway by GHD.

It is understood that the upgrade scope for the water treatment plant now includes a number of process and operational items to be modified. As experts in reverse osmosis water treatment, CONSULTANT will provide technical assistance and support in the role client technical reviewer. This will provide a check that modifications considered are consistent with industry practices and importantly consider operational aspects, keeping consistent with recommendations for operational improvement. This task will consist of regular plant site discussions, discussions with the upgrade contractor (with and on CITY's behalf).

As a starting point for this work, CONSULTANT will conduct an Optimization Prioritization Meeting (est 2 days) to work through the proposed upgrade schedule, set priorities for the City and align schedules for operational components (OMMP, SOPs, monitoring).

This work will ensure consistency between the work conducted by Hazen and Sawyer and other contractors.

The work products for this task include:

- A 2 day optimization prioritization meeting.
- Regular meetings with other contractors with and on CITY's behalf.
- Regular review of plant upgrade progress.

Assist with the Development of Additional Training

This task includes the co-ordination and development of additional training for non-process related items as identified in CONSULTANT's recommendations report. This will include development of training packages by CONSULTANT staff, by CITY with CONSULTANT support, and if required co-ordination of external training support if required (and as agreed by the CITY). This will ensure that CITY operations staff have a complete training package to support operations.

Additional scope items may be included, or existing scope items modified by CITY in writing if approved by the Director of Public Works Services on an ongoing basis. It is anticipated that new or modified scope items would be generated collaboratively by CITY operations staff and CONSULTANT, and submitted to Public Works Services Management for written authorization.

CONSULTANT's estimate for this work will cost approximately **\$40,000** per month, based on an estimate of the above scope items over a 9 - 12 month period, as detailed in Exhibit B. This is a not-to-exceed amount, and the CITY will only be billed for that work which is agreed to in advance in writing for each monthly period.

VI. Summary

In summary, the tasks are as follows:

1. RO Optimization Strategy, Concentrate Minimization Strategy and Valve Specification – not to exceed \$35,000.
2. Operations Training – Process Technology Training Sessions – not to exceed \$20,000.

3. Operating Performance Monitoring Improvements – not to exceed \$51,000.
4. Standard Operating Procedure (SOP) Development – not to exceed \$63,000.
5. Ongoing Support – not to exceed \$25,500/month for 9 to 12 months including
 - A. OMMP Development
 - B. Client Representation/Technical Support for Current Upgrades
 - C. Assist with Additional Operations Training
 - D. Additional Tasks as Authorized in writing by the Director of Public Works Services

EXHIBIT B

SCHEDULE OF PAYMENT AND RATES

SCHEDULE OF PAYMENT AND RATES AS OUTLINED IN ORIGINAL AGREEMENT:

RATES:

Phase 1 - Baseline Review					
	Lynn Grijalva	Troy Walker	Silvana Ghiu	Kenny Chau	Total
	\$287	\$256	\$180	\$105	Not to Exceed
A review of current plant targets and performance against those targets (focusing on production, water quality, and regulatory reporting).		8			\$2,048
A review of plant process performance.			16		\$2,880
A review of current documented systems and processes.		16		16	\$5,770
Interviews with operations staff and operations management.		8			\$2,048
A review of communication practices and protocols.		8			\$2,048
A review of operator knowledge/training gaps.		8		8	\$2,885
Report		16			\$4,096
QA/QC	8				\$2,296
	8	64	16	24	
Labor	\$2,296	\$16,384	\$2,880	\$2,511	\$24,071
Expenses (Airfares and Accommodation)					\$1,929
Task Total					\$26,000

RATES:

Phase 2 - Agree on Priorities and Develop an Action Plan					
	Lynn Grijalva	Troy Walker	Silvana Ghiu	Kenny Chau	Total
	\$287	\$256	\$180	\$105	
Planning with operation management		8			\$2,048
Workshop		8		8	\$2,885
Action Plan Development		32			\$8,192
QA/QC	4				\$1,148
	4	48	0	8	
Labor	\$1,148	\$12,288	\$0	\$837	\$14,273
Expenses					\$727
Task Total					\$15,000

SCHEDULE OF PAYMENT AND RATES AS OUTLINED IN AMENDMENT NO.1:

CITY shall compensate CONSULTANT for the services required by this Agreement in accordance with the cost breakdown, Attachment 1 to this Exhibit.

In no event shall the total cost for the additional services exceed \$229,000, as more fully detailed in Attachment 1 to this Exhibit.

SCHEDULE:

CONSULTANT shall submit an itemized statement to CITY for services performed, which shall include documentation setting forth in detail a description of the services rendered and the hours of service. CITY shall pay CONSULTANT the amount of such undisputed billing within thirty (30) days of receipt of same.

CITY shall compensate CONSULTANT for the satisfactory performance of all the work described in Exhibit A, in an amount not to exceed Two Hundred Seventy Thousand Dollars (\$270,000).

ATTACHMENT 1 TO EXHIBIT B

Task No.	Description	Lynn Grijalva Principal In Charge	Troy Walker Project Manager	Silvana Ghiu Principal Scientist	Kenny Chau Assistant Engineer	Brad Reisinger Associate	Kevin Alexander QA/QC	Labor Hours
FIXED FEE ITEMS								
1	Operations Training							
	Permits and Regulations (Preparation)							0
	Permits and Regulations (Training)							0
	Water Quality Sampling and testing (Preparation)							0
	Water Quality Sampling and testing (Training)							0
	Safety (Preparation)							0
	Safety (Training)							0
	Instrumentation (Preparation)							0
	Instrumentation (Training)							0
	Equipment and Maintenance (Preparation)							0
	Equipment and Maintenance (Training)							0
	SCADA (Preparation)							0
	SCADA (Training)							0
	Process Technology (Preparation, includes all processes)		16	24				40
	Process Technology (Training)		24	16				40
	QA/QC						4	4
		0	40	40	0	0	4	84
		\$0	\$10,240	\$7,200	\$0	\$0	\$1,200	\$18,640
	Expenses		\$1,500					\$1,500
	Task Total							\$20,140
2	RO Unit Operation Options and Concentrate Minimization Strategy							
	Options for operating the RO unit efficiently at a reduced flow rate.			40		16		56
	Concentrate minimization strategy			40				40
	Concentrate valve specification					24		24
	RO Stripper performance improvements			40		20		60
							8	8
	QA/QC							0
		0	0	120	0	60	8	188
		\$0	\$0	\$21,600	\$0	\$10,500	\$2,400	\$34,500
	Expenses							\$0

Task Total							\$34,500
3	Operational Performance Monitoring						
	Definition of Performance Targets with Beverly Hills Staff	16					16
	Development of Key Dashboard Reports	8		24			32
	Review and Improvement of HMI Trending	8	24	40			72
	RO system normalization development (manual normalization)	0	16	16			32
	RO system normalization development (automated from SCADA)				80		80
	Review and modification of log sheets	4		8			12
	Reporting Development	4	16	16			16
	QA/QC					8	16
		0	40	56	104	80	292
	Hazen and Sawyer Labor	\$0	\$10,240	\$10,080	\$10,879	\$14,000	\$47,599
	Expenses (accom for troy + 2 return airfar)		\$2,500	\$300	\$100	\$500	\$3,400
Task Total							\$50,999
4	SOP Development						
	Review and agreement of format and content for new OMMP.						0
	Re-draft of OMMP						0
	Water Quality Monitoring and Reporting Improvements	24					24
	Develop schedule for SOP Development	16	16				32
	SOP Development	80	80	80			240
	QA/QC					16	16
		0	120	96	80	0	312
	Expenses	\$0	\$30,720	\$17,280	\$8,369	\$0	\$61,169
			\$1,125	\$150	\$50	\$50	\$1,375
Task Total							\$62,544
5	Additional As-Needed Support - Subject to City approval prior to commencement of work						\$60,000.00
	Items may include and not limited to the following:						
	a. OMMP Development						
	b. Client Representation/Technical Support for Current Upgrades						
	c. Assist with Additional Operations Training						
	d. Additional Tasks as Authorized						
	Amendment 1 Scope of Work Not to Exceed Total \$229,000						